Fermilab
Acclerator Division/Integration Department

Requirements for a Consolidated Lattice Functions Database for the Tevatron Complex

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Introduction

Several important applications exist that require the values of lattice functions. This is prominently true for the Tevatron, but it is presumed to be true also for other accelerators and beam lines in the Tevatron Complex. Currently, there exists several ways to obtain these numbers, including asking an expert and writing numbers into the source code.

A sensible solution is to create a single source of these numbers that is used division-wide. This document lists the assumptions and the requirements for the data source that provides these numbers. These requirements are presented, in a numbered list with a short justification. It is anticipated that when these requirements are stated and agreed upon by all affected parties, specifications for the database can be written, and implementation will begin.

Assumptions

The data source for the Division's lattice functions shall be an online database.

Requirements

1. **Any accelerator, beam line or storage ring at Fermilab shall be able to have its lattice functions in this database.**

2. **All identifiable programs shall have easy access to this database.**

    Some of the programs are ACNET application programs, so there needs to be a C entry point that returns the values in a well-defined way. Other applications are Java-based, so these programs must have an access method, also.

    It will be necessary to identify all programs that need to access this database before the specifications may be written.

3. **The database shall provide coupled and uncoupled lattice functions.**

4. **A mechanism for updating the database shall exist.**

5. **The update mechanism shall create a trace that identifies the updater and records comments as to the reason for the update.**

6. **The mechanism to update shall be documented so that a non-expert can do it.**

7. **Each entry into the database shall be documented**

    It is imagined that there will be a link, of some sort, to the lattice repository (http://lattices.fnal.gov) and to the BeamDocs documents database.

8. **It shall be possible to retrieve all the lattice functions from an accelerator or a beam line quickly.**

    It is inappropriate, at this stage, to create a time specification for this requirement. But it is envisioned that downloading all the numbers for the Tevatron would take under one second.

9. **The database shall be indexed so that all programs, identified at the outset of the specifications, can access the data conveniently.**

    It is known at this time that some programs access the data by ACNET device name. Others have different ways to access. It is possible to create tables within the database to translate from one "standard" index into another. This may be necessary. It is imagined that TOP (the Tevatron Orbit Program) will define the names for the BPMs and for the Correctors, and that the Emittance OAC will define the names for the flying wires and the synchrotron light.

10. **It shall be possible to retrieve the lattice functions for all devices of a similar type with one query.**

    For example, one should be able to retrieve the lattice functions at all the BPM's.

11. **This database shall be constructed so that it may be used, at some future time, in conjunction with the BLASTMAN database.**

12. **The final database shall be professionally managed by the AD/Accelerator Controls Department.**

    The prototype could be, and probably will be, managed by the author.

Summary

Specifications for a database to retrieve the lattice functions for a machine at Fermilab will be created. The items listed here state the requirements for this database.